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ABSTRACT

A study examined whether non-disabled and disabled readers could be differentiated significantly on specifically stated criteria. The more than 70 variables for investigation included personal data, genetic predisposition, developmental milestones, medical history, psycho-social history, and educational background. Subjects were 302 central Oklahoma children from 7-13 years old, whose parents completed a comprehensive questionnaire about them. The non-disabled readers were chosen from five separate school districts, while the disabled readers were chosen randomly from the files of the Central State University Reading Clinic. Results indicated that these two specific groups could be differentiated on the basis of the measures obtained from the variables. Thirty-three of the variables could significantly differentiate the disabled reading group from the non-disabled reading group, and 13 of those had predictive values, including preschool reading ability, parents' educational level, nervous habits, attentiveness, and gender. Findings suggest that case histories of child development are useful for their predictive qualities. (Tables of data are included, and references are attached.) (NKA)

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A Research Study on Discriminating Factors Predominate in Disabled and Non-Disabled Readers

Running Head: FACTORS IN DISABLED/NON-DISABLED READERS

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A Research Study on Discriminating Factors
Predominate in Disabled and Non-Disabled Readers

FACTORS IN DISABLED/NON-DISABLED READERS

INTRODUCTION

In 1981 the National Joint Committee for Learning Disabilities described the dyslexic and/or learning disabled as a child of average or above average intelligence who has no obvious physical or neurological problems and who performs substantially below grade level on oral reading and word analysis tasks. It has been estimated that 15 percent of United States school children experience serious reading problems, with 0.5 to 5 percent falling into the category of severe reading disability (Calfee, 1983).

Early diagnosis and intervention have been suggested as critical factors in preventing or reducing the severity of the problem (Ekwall & Shanker, 1983; Harris & Sipay, 1980; Goldberg & Schiffman, 1972; deHirsch, et.al., 1966). Data from the present study should prove useful in identifying and controlling the condition in young children.

The research attempted to determine if non-disabled and disabled reading groups could be differentiated significantly on specifically stated criteria. A discriminant analysis of over 300 case histories was utilized to reveal differences in (1) personal data, (2) genetic predisposition, (3) developmental milestones, (4) medical history, (5) psycho/social history, and (6) educational background. Included were some 70 variables. Information was gathered from current files in the Central State University Reading Clinic and from questionnaires completed by parents of average or above-average readers in the surrounding public schools.

Data from the study could be incorporated in a screening instrument having various uses: (1) to supply needed information to diagnostic evaluations, (2) to predict and/or prevent reading/academic problems,

(3) to improve remediation for the disabled reader, (4) to be included in an intake interview for a child study center, (5) to be used in curriculum planning in public schools, and (6) to add content/concepts to reading and elementary education programs at the college level.

A search of the literature from 1946 to the present time revealed that many of the 70 variables in the study have been investigated with at least moderately significant relationships to reading disability reported. However, there were few studies similar in procedure to the present study, i.e., the use of case histories as the source of information.

Most similar to the present study in procedure, variables, and stated purposes was the research of Stratton, et.al., reported in 1981. Using case history data, he investigated relationships among sex, IQ, CA, birth order, siblings in the family, learning problems in the family, and marital status in the family. Ability to predict disability produced an r of .44 which was highly significant ($p < .001$).

Among other studies using parent input as a source of data was the research of Colligan (1981). He found significant correlations between general development, language capabilities, and reading ability. Lorton and Kukuk (1977) investigating 14 social process variables, as reported by parents, found the most significant to be grade repetition and birth trauma. In a homogeneous three generation search for familial characteristics in the reading disabled, McGlanna (1968) identified as significant six hereditary characteristics: namely twinning, diabetes, allergies, left handedness, ambidexterity, and red hair.

Of particular relevance to the present study was the work of Geschwind (1983). In the families of dyslexics, he observed the raised frequency of sinstrality and disorders of the immune system: namely asthma, hay fever, eczema, arthritis, and migraine headaches.

METHODS

Subjects

The 302 subjects which were investigated for this quasi-experimental study were placed in two identifiable groups: non-disabled and disabled readers. The screening procedures for the non-disabled group relied on teacher observations and recommendations. These particular students were selected from five separate school districts in central Oklahoma; two represented rural districts and three were representative of urban districts. Conversely, the disabled group consisted of subjects who were randomly selected from the Central State University Reading Clinic files. These subjects, who were selected from the years 1981-1986, had previously been diagnosed by the professors from the reading staff. The Bond and Tinker formula (1979) was utilized to identify reading expectancy levels. Thus, expectancy levels versus actual levels were assessed, with due respect for the student's grade placement; i.e., a student placed in grades 1, 2, or 3 was considered disabled if a student's actual level was 6 months below the expectancy level, a 1 year discrepancy between actual and expectancy was required for grades 4-6, 1.6 years discrepancy for grades 7-9, and 2 years for grades 10-12.

The subjects comprising the two groups ranged in ages from 7-13 years representing grades 2-8. In efforts to obtain a representative sample a minimum of 20 students was randomly selected from each grade. This, in turn, eliminated the speculation that the findings in this study were primarily due to grade related phenomena. Also, in efforts to maintain control a wide range of socio-economic status was present in both groups.

Procedure

A questionnaire of 70 items, multiple choice, true/false, and fill in the blank, was completed by the parents of the disabled and non-disabled

groups. Since this parent questionnaire for the disabled reading group was an integral part of the diagnostic evalaution at Central State University, procuring this data was easily accomplished. However, the parents of the non-disabled group, who represented five separate school districts in central Oklahoma, were given, via postal service, the questionnaire to complete. The anonymity of their children was respected as each child was given a serial number in lieu of a name.

The 70 items of the questionnaire were selected from a specifically stated criteria, namely:

1. personal data
2. genetic predisposition
3. developmental milestones
4. medical history
5. psycho/social history
6. educational background

RESULTS

Specific correlates which were concomitant with reading disabilities were identified. Statistical measures revealed that these two specific groups can be differentiated on the basis of the measures obtained from a set of 70 variables. Of the 70 variables, it was found that 33 of these variables could significantly differentiate the disabled reading group from the non-disabled group at the .05 level. From the 33 variables a discriminant analysis identified predictive values with 13 of the 33 variables. Due to the variation in questioning some items being multiple choice and others true or false and fill in the blank, it was necessary to implement both t-test and chi-square statistical measures to accommodate for these differences. Tables 1 (T1) and 2 (T2) reveal the results of the t-test comparisons with a .05 level of significance and Table 3 (T3)

gives the results from chi-square, also with a significance level of .05. From the 33 variables which were found to be significant from these two measures, a discriminant analysis technique, Table 4 (T4), was implemented. The results show that from the 33 variables 13 of these were classified as having predictive values; i.e., the percent of grouped cases correctly classified was 84.43%. In essence, there is an 84.43% chance of successfully predicting a disabled reader on the basis of these 13 variables.

Insert Tables 1-4

To put this information in perspective the following is a delineation of the six major categories of interest along with the corresponding variables which differentiate the non-disabled from the disabled reader. This outline will be followed by an explanation of this data.

	Table Reference
1. Personal Data	
*Sex of the child	T3
*Mother's age at conception	T1
*Grade completed by Father	T1
*Grade completed by Mother	T1
2. Genetic Predisposition	
*Relatives with reading difficulties	T1
3. Developmental Milestones	
Age of walking	T1
*Age of talking	T1
Age of sitting	T1
Age of crawling	T1
Is there evidence of speech impairment	T3
4. Medical History	
*Taking medication for respiratory problems	T3
*Any unusual head injuries	T3
*Is the child attentive	T3

	Table Reference
Does the child tire easily	T3
Does he/she seem to hear sounds	T3
Are physical responses quick or slow	T3
Poor muscular coordination	T3
Does the child seem hyperactive	T3
5. Psycho/Social History	
General attitude towards teachers	T2
General attitude towards school	T2
General attitude towards other pupils	T2
*Does the child have nervous habits	T1
*Does the child have pronounced fears	T3
*Is the child given to daydreaming	T3
6. Educational Background	
Grades repeated	T1
Performance in Social Studies, Reading, Math, Language and Writing	T2
Occupation when grown requires college	T3
*Child learned to read before entering school	T3

Personal Data.

According to data on personal history, it was noted that of the 151 disabled readers, 95 of those subjects were male, whereas 68 of the non-disabled group were male. Mother's age at conception was older for the reading disabled and the grades completed by both mother and father were more advanced in the reading disabled.

Genetic Predisposition.

Approximately 70% of the reading disabled noted family members with prior or current reading difficulties. Family members included: uncle,

*Classification results from discriminant analysis of 13 predictive variables.

aunt, grandfather, and grandmother. The number of siblings with reading difficulties was asked but the findings did not prove significant.

Developmental Milestones.

The data on developmental milestones simple stated that the child who has reading problems is slower than his/hers counterparts in the major developmental stages; i.e., walking, talking, sitting, and crawling. Also, in this category, it was reported that in proportion to the non-disabled the disabled readers had a significant number of students who had evidenced speech impairment.

Medical History.

Chi-square revealed significant differences in eight categorical variables pertaining to medical history. Namely, a significant number from the reading disabled took medication for respiratory problems, reported unusual head injuries, seemed to be inattentive, were not able to hear sounds, described their physical responses as slow, had poor muscular coordination, and appeared to be hyperactive.

Psycho/Social History.

The significant variables which were placed under the psycho/social history involved the students general attitude towards teachers, school, and other pupils. In all of these categories it would appear understandable that a significant number of the reading disabled had a negative attitude towards teachers, the school in general, and other pupils. When inquiries were made about nervous habits, the reading disabled were reported to have a higher incidence of these. The nervous habits in question were: nail-biting, blinking excessively, thumb-sucking, stuttering, body tics, and finger sucking. Lastly, the reading disabled were reported to be more fearful and to have had greater occurances of day dreaming in relation to the non-disabled reader.

Eduational Background.

The reading disabled repeated grades more often than the non-disabled readers; they performed less well in social studies, reading, math, language, and writing. When asked what the child wished to be when he/she became an adult a significant number of the reading disabled were reported to have chosen jobs classified as skilled labor, unskilled, or clerical as opposed to occupations requiring higher levels of education, i.e., Bachelor, Master, or Doctoral degrees. Finally, in comparison, the disabled readers did not learn to read before entering school, while the non-disabled had this pre-school experience.

DISCUSSION

As noted in the literature early diagnosis and intervention have been suggested as critical factors in preventing or reducing reading disabilities. In this study, an effort was made to analyze the chronology of child development--that is, the social, emotional, physical, and cognitive changes that mark progression through out existence--in the two identifiable groups, the disabled and the non-disabled. In this global and exhaustive search for pattern incongruities in development, an identification of distinguishable factors that were notably attributed to the disabled reader was made. The comparison of the two groups was essential in assessing the inconsistancies in the developmental pattern of the reading disabled.

Too often studies of this nature have emphasized a skill-based approach, concerned with the accomplishment of reading-related skills. With a case history theme, it was not feasible to add this component to the repertoire of variables considered. The conclusion resulted in a list of differentiating factors with total absence of the accomplishment of skills. The primary

contribution of this study lies not only in its predictive abilities but the ramifications that the multifaceted dimensions of child development have on reading.

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Table 1 Statistically Significant Comparisons between Normal and Problem Reader Groups for 11 Non-School Related Dependent Variables

Dependent Variable Name	Reading Groups						Statistical Comparison	
	Reading Problem			Normal Reader				
	N	Mean	SD	N	Mean	SD	t	Exact Probability
Pupil's Age in Months	151	127.89	24.99	150	133.95	27.05	-2.02	.044
Mother's Age at conception	145	26.02	5.02	147	24.80	4.37	2.21	.028
Grade Completed by father	131	15.04	2.69	145	13.50	2.53	4.90	<.000
Grade Completed by mother	144	14.28	2.42	147	13.14	2.18	4.21	<.000
Age of Walking (Months)	148	11.66	3.28	145	10.73	1.69	3.04	.003
Age of Talking (Months)	137	16.38	7.13	135	12.30	4.93	5.46	<.000
Age of Sitting (Months)	140	5.78	1.43	136	5.42	1.32	2.16	.031
Age of Crawling (Months)	138	7.02	1.88	134	6.46	1.72	2.58	.010
Grades Repeated	151	0.27	0.48	150	0.07	0.25	4.68	<.000
Relatives with Reading Difficulties	151	0.69	0.98	150	0.40	0.67	2.99	.003
Total Nervous Habits Indicated	151	0.38	0.59	150	0.25	0.47	2.03	.043

Table 2 Statistically Significant Comparisions
Below Normal and Problem Reader Groups for Eight School
Performance and Attitude Measures

Dependent Variable Name	Reading Groups						Statistical Comparison	
	Reading Problem			Normal Reader				
	N	Mean	SD	N	Mean	SD	t	Exact Probability
Social Studies	92	2.79	1.05	148	1.72	1.37	6.45	<0.000
Reading Grade	93	2.75	0.88	150	1.31	0.95	11.81	<0.000
Math Grade	102	2.40	0.86	150	1.49	0.90	8.10	<0.000
Language Grade	94	2.80	1.04	149	1.40	0.95	10.78	<0.000
Writing Grade	75	2.57	1.02	149	1.72	1.33	5.34	<0.000
General Attitude to Teachers	147	2.11	0.84	150	1.49	0.59	7.35	<0.000
General Attitude to School	148	2.09	0.85	150	1.40	0.61	8.07	<0.000
General Attitude to Other Pupils	144	2.11	0.78	150	1.55	0.57	7.01	<0.000

Table 3 Significant 2x2 Chi Squares

Comparing The Two Reading Groups With Fourteen Categorical Variables

1. Gender Composition of Reading Groups

	Gender		
	Male	Female	Total
Reading Problem	95	56	151
Normal Reader	68	82	150
Total	163	138	301

Chi Square = 8.67
p = 0.0032

2. Taking Medication for Respiratory Problem?

	Yes	No	Total
Reading Problem	27	124	151
Normal Reader	10	140	150
Total	37	264	301

Chi Square = 7.77
p = 0.0053

3. Any Unusual Head Injuries?

	Yes	No	Total
Reading Problem	29	112	141
Normal Reader	6	143	149
Total	35	255	290

Chi Square = 17.15
p <.0000

4. Is the Child Attentive?

	Yes	No	Total
Reading Problem	80	62	142
Normal Reader	146	3	149
Total	226	65	291

Chi Square = 70.32
p <.0000

5. Does the Child tire easily?

	Yes	No	Total
Reading Problem	24	122	146
Normal Reader	9	140	149
Total	33	262	295

Chi Square = 7.013
p = .0081

6. Does he/she seem to hear sounds?

	Yes	No	Total
Reading Problem	112	26	138
Normal Reader	146	4	150
Total	258	30	288

Chi Square = 18.45
p <.0000

7. Is there evidence of Speech impairment?

	Yes	No	Total
Reading Problem	33	117	150
Normal Reader	5	145	150
Total	38	262	300

Chi Square = 21.97
p <.0000

8. Are physical responses quick or slow?

	Yes	No	Total
Reading Problem	135	10	145
Normal Reader	146	1	147
Total	281	11	292

Chi Square = 8.76
p = .0125

9. Poor muscular coordination?

	No	Yes	Total
Reading Problem	134	14	148
Normal Reader	148	2	150
Total	282	16	298

Chi Square = 8.15
p = .0043

10. Does child seem hyperactive?

	Yes	No	Total
Reading Problem	31	113	144
Normal Reader	12	138	150
Total	43	251	294

Chi Square = 9.71
p = .0018

11. Occupation when grown requires college?

	Yes	No	Total
Reading Problem	49	79	128
Normal Reader	107	39	146
Total	156	118	274

Chi Square = 32.68
p <.0000

12. Does child have pronounced fears?

	Yes	No	Total
Reading Problem	49	80	129
Normal Reader	24	126	150
Total	73	206	279

Chi Square = 16.23
p = .0001

13. Is the child given to daydreaming?

	Yes	No	Total
Reading Problem	66	74	140
Normal Reader	31	117	148
Total	97	191	288

Chi Square = 20.95
p <.0000

14. Child learned to read before entering school?

	Yes	No	Total
Reading Problem	15	132	147
Normal Reader	61	89	150
Total	76	221	297

Chi Square = 34.60
p <.0000

Table 4 Classification Results From
Discriminant Analysis 13 Variables *

		Predicted Group Membership	
		Reading Problems	Normal Reader
Actual Group	Reading Problem (84)	62 (73.8%)	22 (26.2%)
	Normal Reader (128)	11 (8.6%)	117 (91.4%)

Percent of "Grouped" cases correctly classified: 84.43%

*1. Is the child attentive?
2. Child had learned to read before school.
3. Grade in school completed by Mother.
4. Age of talking.
5. Does the child have pronounced fears.
6. Taking respiratory drug.
7. Sex of student.
8. Number of 6 nervous habit categories listed.
9. Grade in school completed by father.
10. Is the child given to daydreaming.
11. Any unusual head injuries?
12. Number of relative categories with reading difficulties.
13. Age of Mother at conception.

Discriminant Function: Predicted classification group = 1.95(1) + 0.85(2) + 0.08(3)

+0.05(4) - 0.71(5) - 0.08(6) - 0.53(7) + .39 (8) + 0.10(9)
- 0.39(10 + 0.52(11) + 0.19(12) + 0.03(13) - 4.57